

Remarks/Arguments:

The abstract has been objected to. The abstract has been corrected. Withdrawal of the objection is respectfully requested.

The title was found to be not descriptive. A new title has been furnished.

Claims 27, 28, 33, 34, 35 and 40 are rejected as obvious over combinations of Scheider (U.S. Patent No. 4,853,512), Okabe et al. (Japanese Patent No. 61-219520), Takarada (U.S. Patent No. 3,778,579), Lobur (U.S. Patent No. 3,435,176), Shih (U.S. Patent No. 6,590,178), Bell, Jr. (U.S. Patent No. 3,809,847), Futamura et al. (U.S. Patent No. 5,111,017) and Angelucci (U.S. Patent No. 3,725,631). These rejections are respectfully traversed for the reasons set forth below.

Pending claim 27 recites a switching element intervening a discharge circuit between the capacitor, and at least one of the tool electrode, the workpiece and the power source; and a switch controller for controlling on and off of the switching element, wherein the switching element alternatively is turned on and off so that duration of the pulse electro discharge is less than or equal to a predetermined time.

The advantage of these features are that if a short circuit occurs, the supply of the electric charge to the workpiece can be immediately halted (see page 16, line 33 to page 17, line 10 of the present specification).

Scheider describes an apparatus including a workpiece, clamping means, and a machining tool electrode. Scheider is directed to a spark erosion machining apparatus incorporating a change mechanism for only a few electrodes. As admitted by the Examiner, Scheider does not teach or suggest any of the other claimed features of the present invention.

Okabe discloses an electric discharge machine including a capacitor, resistor, current detecting circuit, transistor and a discharge control circuit. Okabe is directed to increasing the number of discharge pulses within a certain time and improving efficiency by closing a switching element.

Takarada discloses a toroid 24 to sense the time rate of change of current.

The Official Action contends that it would be obvious to combine Scheider, Okabe as well as Takarada in order to obtain applicants' claimed features of detecting occurrence of a short circuit and current flow in the event of a short circuit.

The Official Action has merely picked and chosen the elements of the claimed invention from the cited references in order to supposedly be combined in the same manner as the claimed invention.

It was the inventors of the present invention that found the problem of the lengthy time required to move the electrode up and down so as to distance the electrode from the workpiece to halt a short circuit, and then the inventors found a new and inventive way in which to solve such problem.

The Official Action has used impermissible hindsight in combining the above references. Nowhere in any of the above references is the problem of time required to halt a short circuit disclosed. Therefore, a person skilled in the art would not be motivated to modify the disclosure of the references to solve a non-existent problem.

It is therefore submitted that the Official Action has not produced a *prima facie* case of obviousness, since there is no suggestion or motivation to modify the cited references.

Furthermore, even if Scheider and Okabe were combined (which they would not be), then the result would be a spark emission machine with higher number of discharge pulses, rather than the presently claimed invention. For this reason, applicants' claims are patentable over the art of record.

In addition, applicants' claim 27 includes a feature which is neither disclosed nor suggested by the art of record, namely:

... wherein a short circuit detection signal is input, the switching element is turned off and, after predetermined time, the switching element is turned on (emphasis added).

As set forth in the originally filed application at page 18, line 23, *et seq.*:

The predetermined time during which the switching element 140 remains switched off is, for example, a sufficient time such that plasma, ions, or swarfs are removed from between the electrode 10 and the workpiece 150.

The art of record includes no disclosure of turning off a switching element for a predetermined time. Takarada (U.S. Patent No. 3,778,579) discloses, for example, at column 4, lines 6-9, that flow of power is interrupted until output from toroid 24 drops below a threshold value. Thus, as

applicants' feature of "predetermined time" is neither disclosed nor suggested by the art of record, claim 27 (and claims dependent thereon) are patentable over the art of record.

Claim 34 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Scheider in view of Okabe et al. and Bell, Jr. in U.S. Patent No. 3,809,847. This rejection is respectfully traversed for the reasons set forth below.

Applicants' claim 34 recited a switching element intervening a discharge circuit between the capacitor, and at least one of the tool electrode, the workpiece and the power source; and a switch controller for controlling on and off of the switching element, wherein the switching element alternatively is turned on and off so that duration of the pulse electro discharge is less than or equal to a predetermined time.

The advantage of this feature is that electrolysis can be prevented and an abnormal machining of a workpiece can be avoided (see page 22, lines 10-17 and page 23, lines 18-25).

Similarly to that discussed above, the problem of preventing electrolysis is not taught or suggested in Scheider, Okabe or Bell, Jr.

Bell, Jr., is directed to the provision of machining pulses of a predetermined duration using time generators and counter means so as to ensure repeatable results and appropriate cutting action.

It was the inventors of the present invention that found the problems associated with electrolysis and the novel way in which to solve that problem.

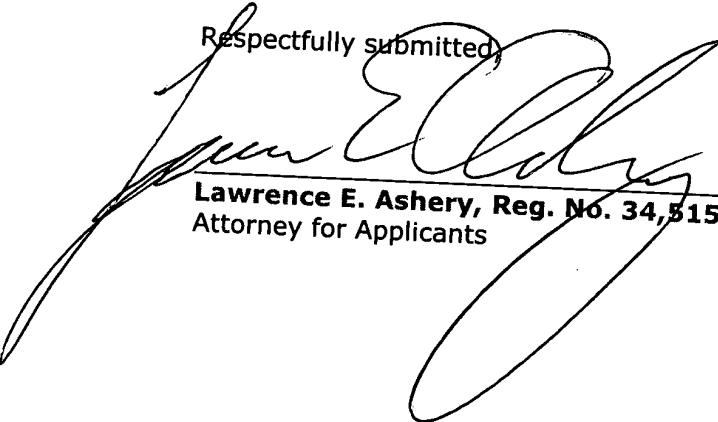
Again, the Official Action has used impermissible hindsight, merely picking and choosing features of the cited references so as to supposedly arrive at the claimed invention. A *prima facie* case of obviousness has not been established. Thus, claim 34 (and claims dependent thereon) is patentable over the art of record.

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For the reasons set forth above, the above-identified application is in condition for allowance, which action is respectfully requested.

Respectfully submitted,


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